

SEG WORKSHOP

Full-waveform Inversion: Filling the Gaps

30 March–1 April 2015
Abu Dhabi, UAE



SEG Middle East
Society of Exploration Geophysicists
The international society of applied geophysics



Sunday, 29 March

17:00 - 19:30.....Registration & Icebreaker



Monday, 30 March

07:30 - 08:30..... Onsite Registration

08:30 - 09:00..... Welcome by Committee Co-chairs

➤ Session 1 *FWI-related acquisition requirements*

Session Chairmen: . Ghiath Ajlani & Christoph Koeninger

09:00 - 09:30..... **Opening Talk by Mohamed Taher Hadidi,**
Abu Dhabi Company for Onshore Oil Operations (ADCO)

09:30 - 10:00..... **Keynote: Smart super grouping of 3D land broadband data**
for FWI *Andrey Bakulin, Saudi Aramco*

10:00 - 10:20..... **Low Frequency Field Data Acquisition for Full Waveform**
Inversion *Thierry Tonellot, Saudi Aramco*

10:20 - 10:35..... Coffee Break - 15 min

➤ Session 2 *Acoustic FWI and its role in the seismic processing workflow*

Session Chairmen:... *Denes Vigh & Mohamed Taher Hadidi*

10:35 - 11:05..... **Keynote: Combining full waveform inversion and**
tomography? *Gilles Lambare, CGG*

11:05 - 11:25..... **Estimation of near-surface velocities by FWI in a depth**
imaging workflow for land cases of moderate complexity:
application to an onshore field, Abu Dhabi
Paul Williamson, Total

11:25 - 11:45..... **Resolution of the complex overburden with FWI: A case**
study from Nile Delta, offshore Egypt
Marwa Elbary, Schlumberger

11:45 - 12:30 Discussion - 45 min

12:30 - 13:30..... Lunch Break

➤ Session 2 *Acoustic FWI and its role in the seismic processing workflow*

Session Chairmen: *Stephane Operto & Rene-Edouard Plessix*

13:30 - 14:00..... **Keynote: Effective quality control of full waveform inversion:**
strength in numbers *Andrew Ratcliffe, CGG*

14:00 - 15:00..... **Poster Session 1**

- Iterative Direct Waveform Inversion, *Phil Bording, Wave Research*
- Full waveform inversion applied to the Chevron/SEG 2014 blind test dataset, *Andrew Ratcliffe, CGG*
- Viscoacoustic full waveform inversion for spatially uncorrelated problems, *André Kurzmann, Karlsruhe Institute of Technology (KIT)*

- Subsalt Imaging with Full Waveform Inversion: Inversion strategy for salt layers, *Niklas Thiel, Karlsruhe Institute of Technology (KIT)*
- Parameterization of density estimation in full waveform well-to-well tomography, *Keisuke Teranishi, Kyoto University*
- Full Waveform Inversion: A Modular Approach for Rapid Research Using an Optimized Code Base, *Eric Trouillot, Acceleware*
- Advances in Vibroseis Technology and Digital Sensors Enhance Low Frequency Recording and Provide Significant Operational Benefits *Jason Criss, Inova*

15:00 - 15:15..... Coffee Break - 15 min

15:15 : 15:45..... **Keynote: Case studies - Multi-parameter FWI**
Denes Vigh, Schlumberger

15:45 - 16:05..... **High-resolution FWI workflow using reflections, refractions**
& multiples *Nizar Chemigui, PGS*

16:05 - 16:25..... **How can we maximize the business benefits of the current**
implementations of Full Waveform Inversion for an oil and
gas exploration company? *Fabio Mancini, Woodside Petroleum*

16:25 - 16:45..... **Bridging Between Geological Information and Seismic Data for**
Low Frequency Compensation in Full Waveform Inversion
Ehsan Jamali Hondori, JGI

16:45 - 17:30..... Discussion - 45 min

Tuesday, 31 March

➤ Session 3 *Multi-parameter FWI*

Session Chairmen:... *Andrey Bakulin & Anatoly Baumstein*

08:30 - 09:00..... **Keynote: Efficient 3D frequency-domain FWI of OBC data in**
the visco-acoustic VTI approximation
Stephane Operto, CNRS Geosciences Azur

09:00 - 09:20..... **Laplace-domain waveform inversion for the 3D acoustic-**
elastic coupled media *Phil Bording, Wave Research*

09:20 - 09:40..... **Frequency-domain waveform inversion based on the**
angle-domain filtered gradient *Yunseok Choi, King Abdullah*
University of Science and Technology (KAUST)

09:40 - 09:55..... Coffee Break - 15 min

09:55 - 10:25..... **Keynote: Elastic multi-parameter waveform inversion of**
low-frequency, wide-aperture land data sets
Rene-Edouard Plessix, Shell

10:25 - 10:45..... **The choice of the physical law and constraints in seismic FWI**
Christophe Barnes, University of Cergy-Pontoise

10:45 - 11:05..... **Improvement of 2-D elastic VTI inversion using isotropic**
parameters *Dong-Joo Min, Seoul National University*

11:05 - 11:50..... Discussion - 45 min

11:50 - 13:00..... Lunch

➤ Session 4 *Reformulation of FWI criterion for reflections*

Session Chairmen: *Paul Williamson & Gilles Lambare*

13:00 - 13:30..... **Keynote: Full model wavenumber inversion (FMWI)**
Tariq Alkhalifah, King Abdullah University of Science and
Technology (KAUST)

13:30 - 14:30..... **Poster Session 2**

– Medium parameters from diving wave image moveout, *Alexey Stovas,*
Norwegian University of Science and Technology (NTNU)

– Analysis of the multi-component qP-wave inversion in acoustic transversely isotropic media, *Ramzi Djebbi, King Abdullah University of Science and Technology (KAUST)*

– Dix-Type Inversion in HTI Media, *Nabil Masmoudi, King Abdullah University of Science and Technology (KAUST)*

– Improved Full Waveform Inversion Procedure Based on Scattering

– Angle Enrichment, *Zedong Wu, King Abdullah University of Science and Technology (KAUST)*

Multi-stage full waveform inversion strategy for 2D elastic VTI media,

– Ju-Won Oh, *King Abdullah University of Science and Technology (KAUST)*

– Bayesian approximation error method for full-waveform inversion, *Tomi Huttunen, University of Eastern*

– Newmark Local Time Stepping for Large-Scale Wave Propagation, *Max Rietmann, ETH Zurich*

14:30 - 14:45..... Coffee Break - 15 min

14:45 - 15:15..... **Keynote: Combining reflected and diving waves for**
multi-scale Full Waveform Inversion
Romain Brossier, University of Grenoble/SEISCOPE

15:15 - 15:35..... **Plane-Wave Extended Waveform Inversion and Its**
Application in an Onshore Seismic Dataset
Yujin Liu, SINOPEC

15:35 - 15:50 *Arthur B. Weglein, University of Houston*

15:50 - 16:45..... Discussion - 45 min

19:00 - 21:30..... Group Dinner

Wednesday, 1 April

➤ Session 5 *Modeling HPC*

Session Chairmen:... *Phil Bording & Thierry Tonnelot*

08:30 - 09:00..... **Keynote: Seismic Simulation For FWI**
John Anderson, ExxonMobil Upstream Research

09:00 - 09:20..... **Full waveform inversion based on an unstructured-grid**
modeling method *Wei Zhefeng, SINOPEC*

09:20 - 09:40..... **Wavefield Compression for Full-Waveform Inversion**
Christian Boehm, ETH Zurich University

09:40 - 09:55..... Coffee Break - 15 min

➤ Session 6 *Performance and constraints*

Session Chairmen: *Andrew Brenders & Paul Williamson*

09:55 - 10:25..... **Keynote: Stochastic resolution analysis in full-waveform**
inversion *Andreas Fichtner, ETH Zurich University*

10:25 - 10:45..... **Incorporating spatially localized constraints in gradient-**
based optimization
Anatoly Baumstein, ExxonMobil Upstream Research

10:45-11:05..... **High level performance prediction applied to seismic**
imaging algorithms *Philippe Thierry, Intel*

11:05 - 11:50..... Discussion - 45 min

11:50 - 13:00..... Lunch

➤ Session 7 *Near surface*

Session Chairmen: *Romain Brossier & Aldo Vasnever*

13:00 - 13:30..... **Keynote: Full Waveform Inversion: challenges in the**
presence of surface waves *Herve Chauris, Mines ParisTech*

13:30 - 13:50..... **Applications of 2-D elastic full waveform inversion to**
shallow seismic surface waves *Thomas Bohlen*
Kumoh National Institute of Technology (KIT)

13:50 - 14:10..... **Rock-physics guided and pore pressure constrained FWI**
for shallow geo-hazard detection *Yangjun (Kevin) Liu*
Schlumberger

14:10-14:25..... Coffee Break - 15 min

➤ Session 8 *Reservoir characterization, seismic interpretation and time-lapse/4D applications*

Session Chairmen: *Tariq Alkhalifah & Mamoru Takanshi*

14:25 - 14:45..... **Stable phase unwrapping: A new tool for full-waveform**
inversion *Aldo Vesnaver, Petroleum Institute*

14:45 - 15:05..... **CO2 thin layer detection at Sleipner with full-waveform**
inversion *Anouar Romdhane, SINTEF Petroleum Research*

15:05 - 15:25..... **Approaches of time-lapse surveys based on**
repeatable/broadband source and full waveform inversion
Mamoru Takanashi , JOGMEC

15:25 - 16:30..... Discussion - the future 1hr and 5min

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